sodium near the ocean[6]. Finally, there is the recent attempt by Lytle and Hunten[7] to detect the resonance lines of potassium in twilight. This places an upper limit of 1 : 40 on the potassium–sodium ratio, whereas sea water has a ratio of 1 : 47 and all other sources between 1 : 10 and 1 : 5. At this time the evidence must be taken as favouring a marine origin.

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Effect of Cathode Inclusions on Electrical Discharges

Recognition has been given for some considerable time now to the fact that the surface of the negative electrode in a spark gap can influence the electrical discharge[1]. An attempt has been made to ascertain the location of the starting place of arc spots in relation to the metallurgical features of the cathodes.

As is well known, metals frequently contain microscopically visible inclusions often of more than one type chemically. In stainless steels, with which we have been principally concerned, oxides, nitrides, carbides, slag particles and pieces of refractories are the major inclusions.

Microscopical examination of clean polished specimens which had been used as negative electrodes in a small experimental spark gap showed that metal had vapourized from around certain inclusions, the bulk of the material being unaffected. It is of considerable interest to note that the inclusions affected possessed low electrical conductivity whereas inclusions of relatively good conductivity were entirely unaffected.

This phenomenon is by no means peculiar to stainless steels. For example, localized damage has been found around cuprous oxide inclusions in samples of copper. Cuprous oxide also has a low electrical conductivity. The current passing in these experiments under non-arcing conditions was approximately $1{\cdot}6 \times 10^{-4}$ amp. cm.$^{-2}$ and the minimum resistivity for arc initiation appears to be 10^3 ohm. cm.

This work, which forms part of a programme to investigate surface properties of metals, is to be reported in detail elsewhere.

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[1] See, for example, Jones, F. Ll., "The Physics of Electrical Contacts" (Oxford Univ. Press, 1957).

X-ray Spectrographic Determination of Strontium

Roberts[1] recently described an X-ray fluorescence spectrographic method for the determination of strontium in animal bone using the Philips *PW* 1520 spectrograph fitted with a quartz analysing crystal. In our laboratories a lithium fluoride crystal was available and was used for similar analyses since, compared with a quartz crystal, it increases the intensity of the strontium $K\alpha$ line by a factor of 2·8 and the line/background ratio by a factor of 1·15. Thus the counting time to achieve a given coefficient of variation (due to the counting statistics) can be reduced by a factor of 3·5 or, if the same counting time is compared, the coefficient of variation can be reduced by a factor of 1·9, by using the lithium fluoride crystal.

The instrumental conditions were: Philips X-ray spectrograph, *PW* 1520; tungsten target tube, 48 kV., 20 m.amp.; argon-filled Geiger counter; X-ray path evacuated; exit collimator not fitted. Samples were prepared in a manner similar to that described by Roberts, but the 'Mylar' film was not removed from the sample holder because of the potential danger of contamination of the window of the X-ray tube. The absorption of the strontium radiation by this film is theoretically about 0·1 per cent and, in practice, was not detected.

The specific intensity of the strontium $K\alpha$ line from milk powder ash was found to be identical with that from animal bone ash, and results obtained by several different methods for both these types of sample are compared in Table 1.

Table 1

Sample	Strontium content (p.p.m.)			
	X-ray spectrography	Emission spectrography (ref. 2)	Neutron activation*	Flame photometry (ref. 2)
Bone ash				
1	90	90	89	89
2	120	109	—	124
3	198	190	—	192
4	340	345	—	335
Milk ash				
1	33	36	33	32
2	34	31	32	33
3	56	45	53	51
4	65	64	65	64

* Determinations carried out by Dr. G. E. Harrison and Mrs. E. Sowden, Medical Research Council Radiobiological Unit, Atomic Energy Research Establishment, Harwell.

Since these determinations were carried out, a molybdenum-target X-ray tube has been obtained and shown to increase the intensity of the strontium line by a factor of 1·5 and improve the line/background ratio by a factor of 2·5. Thus with this tube and a lithium fluoride crystal it is possible to determine 10 p.p.m. strontium in bone or milk powder ashes in 30 min. with a coefficient of variation due to the counting statistics of 10 per cent.

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